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10/691,944	10/23/2003	Lowell D. Bok	56181.2500	6320
85628	7590	12/02/2009		
SNELL & WILMER L.L.P. (GOODRICH)				
ONE ARIZONA CENTER				
400 E. VAN BUREN STREET				
PHOENIX, AZ 85004-2202				
EXAMINER				
VETTER, ROBERT A				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
12/02/2009		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dboyd@SWLAW.COM

snieto@swlaw.com

jeslick@swlaw.com

Office Action Summary

Application No.

10/691,944

Applicant(s)

BOK ET AL.

Examiner

ROBERT VETERE

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-11, 13-18, 20-23, 25-28 and 42-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-11, 13-18, 20-23, 25-28 and 42-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Prioritization's Patent Drawing Review (PTO-544)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Examiner's Comments

An amendment, amending claims 1, 8-9, 11, 23, 26 and 45 was received and entered into the record on 8/5/2009. Applicant has requested confirmation that the rejection under § 102 of claims 45 and 47 was withdrawn in the previous action. The examiner confirms that this rejection was withdrawn, at least in part, because claim 47 had been cancelled. Claim 45 was rejected under 35 USC 103(a) as unpatentable over the combination of Froberg, Purdy, and Golecki.

Drawings

1. The drawings were received on 8/5/2009. These drawings are accepted and entered into the record.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 10 recites the limitation "said mixture" in line 1. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20 depends from a cancelled claim.
6. Claim 18 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 18 fails to further limit the claim from which it depends.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1792

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 3-8, 11, 13-18, 20, 22-23, 25-28 and 42-44 rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg (US 3,944,686) in light of Purdy et al. (US 2001/0019752), Golecki et al. (US 5,348,774) and further in light of Madan et al. (US 5,016,562).

Claims 1, 4-6, 11, 14-16, and 23: Froberg teaches a method for vapor depositing pyrolytic carbon on porous sheets of carbon material. Specifically, an elongated continuous porous sheet of fibrous carbon (i.e. porous material) is longitudinally traversed through a reduced pressure heating zone (i.e. continuously loading the porous material into a CVI chamber) while introducing a reactant gas onto the heated porous sheet (i.e. densification/infiltration) (see abstract; 2:65-68). The sheet moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; 4:1-10).

Regarding the limitation of placing said porous material into a module(s), it is very well known in the CVI art to place porous material into modules for densification processes (for example, see [0090], [0092], and figs. 17 and 18 of Purdy as evidence). Purdy also discloses preheating a reactant gas (i.e. via pre-heater 458 of fig. 15)/introducing said reactant gas into said CVI chamber while heating a porous material in said module with a heater plate proximate said porous material, whereby said porous material in said module is densified [0062], [0068], and [0082]). Purdy teaches using multiple modules for densifying a large number of porous substrates (i.e. multiple individual modules) (see fig. 18; [0092]). Furthermore, Golecki teaches that such densification methods may be conducted in a one step (e.g. batch) process or may also made into a continuous process by straightforward extensions of the batch system (11:23-41). Therefore, Golecki teaches that both batch and continuous densification processes were known in the art at the time of the invention AND easily inter-changeable.

Froberg, Purdy and Golecki, however, fail to expressly state that the individual modules each have a gas inlet and outlet. Madan, however, teaches a modular CVD apparatus wherein each module

Art Unit: 1792

has a gas inlet and outlet (see, e.g., 6:27-44). Furthermore, the examiner takes Official Notice that it is well known in the art that apparatuses which perform CVD are also capable of performing CVI. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected modules which contained a gas inlet/outlet in the combined method of Froberg, Purdy and Golecki with the predictable expectation of success.

Claims 3 and 13: Froberg teaches removing the porous structures from the chamber after a heat treatment, which will inherently cool the porous material.

Claims 7, 17 and 25: Froberg does not explicitly disclose a reverse gas flow process; however, once the reactant gas is introduced into the chamber, the gas will interact with the heating plates and will inherently have the same effect as the reverse flow rate of the second pre-heater of the instant application 4:1-10).

Claims 8, 18, 19 and 42-43: Froberg discloses a reactant gas mixture comprising acetylene, natural gas, methane, etc (3:17-26), whereby natural gas inherently contains propane.

Claim 22: Froberg teaches processing pressures within the range of 50-760 torr (3:9-16).

Claim 20: Froberg discloses a reactant gas mixture comprising acetylene, natural gas, methane, etc (3:17-26). Natural gas is a mixture of gaseous hydrocarbons with methane as the chief component while the balance is composed of varying amounts of ethane, propane, butane, and other hydrocarbon compounds. Therefore, propane is necessarily present in the mixture. Choosing specific percentages of methane and propane as per claim 20 would have been within the level of ordinary skill in the art at the time of the invention.

Claim 26: Froberg teaches a method for vapor depositing pyrolytic carbon on porous sheets of carbon material. Specifically, an elongated continuous porous sheet of fibrous carbon (i.e. porous material) is longitudinally traversed through a reduced pressure heating zone (i.e. continuously loading the porous material into a CVI chamber) while introducing a reactant gas onto the heated sheet (see abstract). The sheet moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located

Art Unit: 1792

above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; 4:1-10). Froberg does not expressly teach placing the material into a module or loading the module into said CVI chamber. It is very well known in the CVI art to place porous material into modules for densification processes (for example, see [0090], [0092], and figs. 17 and 18 of Purdy as evidence). Froberg does not explicitly disclose a reverse gas flow process. However, once the reactant gas is introduced into the chamber, the gas will interact with the heating plates and have the same effect as the "reverse flow rate" of the instant application (4:1-10).

Claims 27-28: Froberg teaches heater plates above and below said module/porous material (4:1-10).

Claim 44: Froberg teaches a sheet is moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; 4:1-10). Froberg does not expressly disclose the dimensions for the heat plates; however, it would have been within the level of ordinary skill in the art at the time of the invention to optimize the shape of the heater plates in order to minimize the cooling effect of the incoming gas and to provide uniform heating of the substrate with the reasonable expectation of success.

9. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg, Purdy, Golecki and Madan in light of Wolfson et al. (US 4,596,208).

Art Unit: 1792

Claims 9-10: Froberg, Purdy, Golecki and Madan do not expressly teach that the modules have a top and bottom gas chamber with the central chamber. However, Wolfson explains that such a configuration is well known in the art of CVD/CVI (Abst.). While Wolfson is directed to a singular processing chamber, one of ordinary skill in the art at the time of the invention would have recognized that such a configuration would be applicable to a modular chamber if such a configuration was desired. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected modules with a top gas chamber, a bottom gas chamber and a central chamber in the combined method of Froberg, Purdy, Golecki and Madan with the predictable expectation of success. Claim 10 is rejected for the same reasons given above with respect to claim 20.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg, Purdy, Golecki and Madan in light of Sekiya et al. (JP 08002976).

Claim 21: Froberg does not expressly teach a temperature in the range of 1700-2500°F. Sekiya teaches a method for producing a carbon fiber/carbon based matrix composite material prepared from carbon fibers according to a chemical vapor infiltration method (CVI method) whereby the temperature is regulated at 1200-1300°C, which is within the claimed range (see abstract). Therefore, one having ordinary skill in the art at the time of the invention would have utilized the temperature range as taught by Sekiya in Froberg's CVI method in order to densify a porous material at lower temperatures, thus saving energy and decreasing the cost of processing in Froberg's method with the reasonable expectation of success.

11. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg, Purdy, Golecki and Madan in light of Fisher et al. (US 6,083,560).

Claim 45: Froberg/Purdy/Golecki does not expressly state that the heater plate has varying thicknesses. However, it is well known in the art to optimize the temperature in CVI processes in order to obtain the desired deposition rate (see Fisher at 14:20-28). Therefore, it would have been obvious to one skilled in the art at the time of the invention to vary the thickness/size of the heater plates in order to attain the optimum temperature for a desired deposition rate.

Response to Arguments

12. Applicant's arguments filed 8/5/2009 have been fully considered but they are not persuasive.

Applicant first argues that Purdy and Golecki fail to teach that each module has individual gas inlet and outlet ports. This argument is moot in light of the new grounds of rejection presented above.

Applicant further argues that Golecki fails to teach a continuous process. This is not persuasive. Golecki states, at 11:23-41, that the process is performed continuously.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 1792

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT VETERE whose telephone number is (571)270-1864. The examiner can normally be reached on Mon-Fri 9-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Vetere/
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792